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CONTENTS

	Page
Editorial: Identification at Last	397
Fresh Mushroom Packaging of the Future: Robert Bull, U.S.A....	398
"WATERY STIPE" OR "BROWN DISEASE": Dr. R. L. Edwards	400
MGA Appoints Public Relations Consultants... ..	402
SYMPOSIUM ON AN UNIDENTIFIED DISORDER OF MUSH- ROOMS	403
IT IS "LA FRANCE" DISEASE: Dr. J. W. Sinden & Mrs. E. Hauser	407
A Modern Mushroom Calypso	409
The Irish Discuss Mushrooms	409
MUSHROOM QUESTIONNAIRE—IMPLICATIONS FOR INSECT PEST RESEARCH: Dr. N. W. Hussey	410
Four Months Later—and Less Too!	413
Fancy That!	413
World Press Digest	414
Stems and Pieces: Joseph M. Michaels, U.S.A.	422
The Improvement of Peak Heating Rooms for the Mushroom Industry	426
Correspondence	428
Last Month's Publicity Contributions	428
Publicity Subscribers	429
Membership List	432



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EDITORIAL

IDENTIFICATION AT LAST

The positive identification by Dr. J. W. Sinden and Mrs. E. Hauser, of the recent somewhat disastrous mushroom disorder as "La France" disease, will be welcomed by growers everywhere, not only those who have and still are suffering, but by those who have so far escaped and who may well, by the lessons now learned, continue to be free.

This identification will be welcomed on two particular counts (1) because it does away with the rife speculation as to what the disorder is and (2) because two or three large farms in England suffered from severe attacks a year or two ago and all have overcome them.

The view of Dr. Sinden and Mrs. Hauser is reinforced by that of Miss D. G. Gandy, from the Glasshouse Crops Research Institute, who states elsewhere in this issue, "Three years ago I am sure that, rightly or wrongly, it would have been called 'La France' disease."

As Dr. Sinden and Mrs. Hauser state, "until more information as to the cause of this disease is available, its control cannot be more specific and we must do more than is probably necessary." Again and again, wherever mushroom growers gather and confer, the need for hygiene has been stressed and stressed and the recent scare throughout the industry, for scare it certainly was and still is, will, in the end prove beneficial if it serves to instill into the minds of all growers, once and for all, that any let up in farm hygiene will, almost inevitably, lead to disaster.

There is no secret in the fact that the cause remains a mystery and, in this respect in particular, the recent meeting at Agriculture House, attended by some of the horticultural scientists may do great good. The offer of co-operation too, by several well-known firms in the industry, apart from growers, is yet a further indication of the goodwill which exists amongst all branches of the cultivated mushroom world.

WRA

FRESH MUSHROOM PACKAGING OF THE FUTURE

by Robert Bull

*Agricultural Extension Service
University of Delaware, U.S.A.*

Competition for the consumer's dollar is becoming increasingly keen. All segments of the food industry must constantly re-evaluate their packaging and merchandising practices if they are to avoid losing out in this competitive battle waged with skilled selling techniques. Many different food products, various producing areas and the individual producers all are competing in numerous ways. To-day, continual improvement in marketing methods is essential.

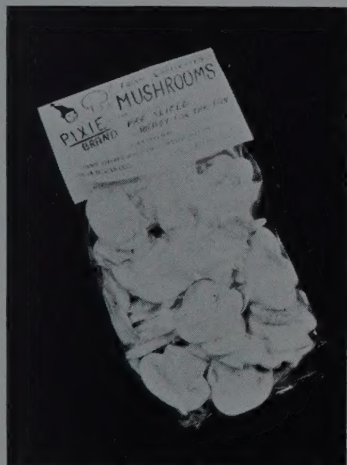
Fresh mushroom marketing has not undergone any really drastic changes in recent years, aside from a gradual growth in the popularity of the consumer-size packaging unit. On the other hand, almost revolutionary changes are occurring in the marketing of other food products. Lemons are pre-squeezed and the juice comes in a plastic artificial lemon, tossed salads are ready-made, frozen chicken pot-pies are all set to put into the oven, cheese is grated, chickens are eviscerated, cake ingredients are already mixed, some potatoes are even pre-peeled. The popularity and profitability of these new marketing practices are self-evident.

Competition for the consumer's dollar is taking the form of new services and better packaging. Products that are good competitors on this basis are growing by leaps and bounds. The others are taking a back seat. To-day's shopper is motivated by convenience to a greater extent than ever before. She is attracted first of all to those foods that are easiest to prepare and in the most eye-appealing packages.

Let's take a closer look at the modern home-maker and how she spends her food dollar. There is a good chance that the typical shopper is a working woman. Nearly one-third of our nation's labour force now is made up of women. More than one-half of these working women are married. In order to hold down a job away from home, most of these women need some maid service in order to get the home-making job taken care of too. This maid service comes to them in the form of partially prepared foods. It is built right into their food purchases. Of course, food often costs more money this way, but the only alternative to partially prepared foods is for the working women to spend more time in the kitchen. Working women, perhaps with growing children as well as a husband to care for, are more apt to have a little extra money for convenience foods than they are to have extra time for working at the kitchen sink.

Recently the U.S. Department of Agriculture completed a study of the extra costs of convenience foods and the amount of kitchen work time they saved. The results showed that, by buying convenience foods, women spend 45c. extra for each hour of food preparation time they save. That few home-makers are willing to work for 45c. an hour is

shown by their rapid acceptance of new foods which feature built-in maid service. Such foods include ready-to-cook or pre-cooked meats and prepared vegetables. They not only save home-makers' time and labour, but result in less waste in buying, and usually in greater uniformity in quality.



There are undoubtedly many opportunities for increasing mushroom sales by making mushrooms more competitive with other foods having built-in conveniences. One of the first possibilities which comes to mind, for example, is that of pre-slicing mushrooms so they can be sold to consumers all "ready-for-the pan." Pre-sliced mushrooms, as shown in the accompanying photograph, have several advantages in addition to convenience. First of all, the shelf-life is automatically extended. Interior cut surfaces of mushrooms do not discolour rapidly as do the caps and stems of whole mushrooms, hence the appearance of sliced mushrooms remains acceptable to consumers for a longer period of time. Anti-oxidant dips can

further reduce browning and help prevent drying. Secondly, the misconception of many people that mushrooms must be peeled is likewise overcome automatically when they can be featured in a pan-ready form. Sales of whole mushrooms undoubtedly are deterred because the many people who think mushrooms need peeling simply do not want to go to that much trouble. Thirdly, sliced mushrooms can be packaged in film bags offering almost 100% visibility, a packaging method that often causes whole mushrooms to bruise excessively.

It is true that consumers are not actively demanding conveniences, such as pre-slicing, in the mushrooms they buy. They have dramatically demonstrated that there is a great potential demand for such products, however. The demand is created when something is produced for which consumers will readily spend their money. We must remember that there was no active demand for air conditioning, home permanent wave kits, airplane transportation, television sets, frozen orange juice concentrate or anything else until the service or product was made available so people could try it. So it is with possible improvements in mushroom marketing.

New marketing techniques, as much as any other single factor, can stimulate greater demand for mushrooms. We must stop and ask ourselves whether there are some more or different services that will boost sales and profits in the mushroom industry. Over the long term, the industry may otherwise lose ground to those other products which do improve their competitive position by such means.

"WATERY STIPE" OR "BROWN DISEASE"

By Dr. R. L. Edwards

For any infectious disease to develop a major attack three important conditions must be satisfied:—

1. There must be present in sufficient numbers an infective organism capable of attacking the host organism.
2. The host organism must be susceptible to attack.
3. Physical conditions in the environment must be favourable enough to the disease organism to allow it to attack.

None of these is a simple "on" or "off" condition; they may all vary in degree and may be further affected by other factors, so that whether or not a disease breaks out, and if it does, the severity of the outbreak, is determined by a complex balance of factors.

Examples may be quoted to illustrate these various conditions:—

1. I do not know of an instance among mushroom diseases, but it is common among bacteria and viruses causing human disease, to find or develop strains of greatly reduced virulence, and they are sometimes used to produce immunity to the disease, where it would be dangerous to use the normal virulent strain.
2. There are examples of resistance to mushroom diseases, such as the apparent immunity of Danish brown mushrooms to *Mycogone*, and **Middlebrook's** observations on the occurrence of some diseases selectively on certain spawns. This has also been observed more recently by **Rasmussen**.
3. Physical conditions can be quite decisive; e.g., the inability of Truffle to attack at low temperatures, and the presence of *Verticillium* without attack on mushrooms at Yaxley under conditions of good ventilation with moderately low temperature and humidity. I have seen this effect repeatedly. Other factors which may affect an outbreak include the presence of insects to spread infection, existence of a biological "vacuum" in sterilised casing, and presence of protective chemicals.

There are mutually quantitative relationships between these factors; a heavy enough initial infection may be able to overcome slightly unfavourable conditions or a small degree of resistance; or very favourable conditions may enable a trace infection to develop into a severe outbreak of disease.

I think this general picture, which is quite well established, helps us to understand and reconcile some of the apparent contradictions in the attacks of Brown Disease on mushroom farms in the last few years, though it does not provide a full explanation of all that has happened. On some farms, for example those for which **Dr. Storey** (at Southport) showed cropping diagrams, environment has been a major factor, and changes in weather, which do have quite a marked effect on air conditions inside a house, were enough to promote or prevent outbreaks of disease.

On others the infection seems to be the dominant factor and no effect of weather has been observed. (It may not have been very seriously looked for.)

I should like to see more precision in statements about loss of crop; these are sometimes quite true but very misleading.

Thus a fall in average yield from $1\frac{1}{2}$ lb./sq. ft. to $\frac{3}{4}$ lb. is disastrous. If all crops in a period of six months fall like that, one must look for a general cause affecting the whole farm at some stage of cropping. But if a quarter of the crops still give $1\frac{1}{2}$ lb., and three-quarters of them give only $\frac{1}{2}$ lb. the average yield and the disaster are the same, but the search for the cause will take quite different lines. Clearly in this case there is something wrong with the low crops only, which does not affect the good ones.

I think someone at Southport referred to the unlikelihood that an experienced grower like **Mr. N. R. Cooper** would grow 40 successive bad crops. It seemed to me from Dr. Storey's charts that Mr. Cooper did not have 40 successive bad crops; he had periods of good and bad crops, and some indifferent ones. And I think a spell of trouble like this prevents a grower giving of his best even when the disease itself subsides, possibly by inducing over-caution in watering, etc.

Bacterial rotting of dead or dying mushrooms is common but not universal, and does not seem very likely to be a characteristic of this disease—if indeed it is a single disease.

Tilting caps are less usual and are less likely to be a secondary effect. The dull greyness of the caps, turning brown, I have seen before on at least two farms, and I was inclined to attribute it to physical conditions although I admit that I could not explain it to my own complete satisfaction.

Through the courtesy of **Mr. G. V. Allen** I have seen the replies to his questionnaire and I have tabulated some of them. The accounts of symptoms were too indefinite to provide much scope for this kind of study, but some of the replies which recorded no symptoms could be separated at once, and others could be grouped according to the loss of crop. In considering the possible effect on the disease of the various cultural details given, it is essential to remember that such things as wet, medium, and dry compost or casing, and good, bad or indifferent air conditions represent the personal opinion of the grower. I think this reservation applies particularly to air conditions.

The only real suggestion of a relation between methods and incidence of the disease is in the high proportion of heavy crop losses where peat casing was described as "wet"; in **this group no-one entirely escaped symptoms of the disease, and 70% suffered heavy loss. Even so this relation is not marked enough to be described as statistically significant.**

To conclude, there is nothing contradictory between infection and cultural conditions as contributors to the disease. The evidence for cultural conditions as an important factor is very strong.

Since writing this article I have received further news from some growers who have experienced this disease, and I think it would be interesting if all those who contributed to the discussion would write

to the Bulletin, say in January, describing any action they took after the Southport Conference, and the results they have obtained.

Table showing numbers of farms using various cultural methods and reporting on symptoms and loss of crop attributed to "Brown Disease," in replies to Mr. G. V. Allen's questionnaire.

		No symptoms No loss	Some symptoms of crop	Av. yield over 50% of normal	Yield 50% or less	Total No. of farms	Total number giving data on each subject
Trays	...	2	2	5	6	15	26
Shelves	..	2	1	0	8	11	
Compost							28
Over 16 days	Long	3	1	1	4	9	
11—16 days	Medium	1	1	5	3	10	
Under 11 days	Short	2	1	0	6	9	
Spawn	Grain	3	1	5	10	19	27
	Manure	2	2	1	3	8	
	Supplier A	2	0	2	8	12	32
	B	4	3	3	7	17	
	C	0	1	1	1	3	
Compost moisture	Wet	1	1	1	4	7	26
	Medium	3	1	4	7	15	
	Dry	2	1	1	0	4	
Casing moisture	Wet	0	1	2	7	10	25
	Medium	3	2	4	3	12	
	Dry	2	0	0	1	3	
Air conditions	Good	2	1	4	7	14	26
	Medium	4	2	1	4	11	
	Bad	0	0	0	1	1	
Total in symptoms and crop groups		5—6	3	5—6	10—16		

Explanatory note to table:—

The total numbers of entries vary a little because some replies omitted some data, and others used more than one spawn, etc.

MGA PUBLIC RELATIONS CONSULTANTS

Albion Publicity Limited of 52 Queen's House, Leicester Square, London, W.C.2, have been appointed Public Relations Consultants to the MGA.

Mr. G. V. Reed of Woking, who for some years has put in so much fine work for MGA Publicity, has been appointed a Director of Albion Publicity and will continue to watch over the MGA public relations work.

Several growers and advisory and research workers described their experiences with "Brown Disease", more recently renamed "Watery Stipe", at a discussion at Southport.

In view of the general interest in the subject and the lack of an authoritative account of the disease, its causes and cure, the following notes taken from the discussion are published for the benefit of members.

Mushroom Growers' Association—Southport Conference

SYMPOSIUM ON AN UNIDENTIFIED DISORDER OF MUSHROOMS

N. R. COOPER, Kimcote, Rugby

The disorder first appeared in May, 1956, on one side of one house. Peat was among the suspected causes but the use of sterilised peat, if anything, seemed to make the trouble worse. Subsequent increase in ventilation increased the yield from $\frac{1}{4}$ lb. to $\frac{3}{4}$ lb. per sq. ft. but did not completely cure the trouble. About the time of the first attack, the composting method was slightly changed by using a machine; turning at the same intervals as before, a better breakdown and higher temperatures were obtained, but, he suggested, "an error in composting might be responsible." He added, "The spawn seems to deteriorate in the beds about 2 weeks after spawning, and quickly looks like the spawn of a 7—8 week old crop." **Cleaning procedure:** Houses are heated with live steam before emptying to 150° F. for 8 hours. All trays are cold dipped in disinfectant. Both SDNOC and Santobrite have been used and SDNOC has been used in buildings all round the farm. The spawn growth was usually good and quick. The trouble was never found where the spawn remained healthy and vigorous. It occurred in a set of new trays. Some blobs of water were seen on the spawn grains on the surface of the bed.

Spread can be stopped by channelling across the casing, down to the compost. It is unnecessary to channel the compost.

G. V. ALLEN, Ashford, Kent

About the end of the second flush mushrooms were found to be lightly rooted; growth in the peat was strandy, and in the compost it had all gone.

In October, 1956, when "lighthouses" started to appear in the second flush he tried to improve ventilation. In March, 1957, browning started. In a Nissen hut with 600 trays, 400 trays with one spawn were affected, all the mushrooms going brown in the 4th flush, while 200 trays with a different spawn remained clear. In the next crop the trouble occurred in the 3rd flush and both spawns were affected. In August, 1957, all crops became affected in various ways from the first flush onward. In September, 1957, one crop gave a good first flush and then started to go off. During the whole period there were some good crops. Where the mushrooms only turned brown the yields were subnormal but not disastrous, but where malformations occurred yields were very bad.

Mr. Allen said he knew of another grower who in 1953-54 had trouble with symptoms identical with his, including both malformations and browning.

G. C. GRIFFITHS, Congresbury, Somerset

The trouble started in patches in 1953, and by October, 1956, average yield in trays was down from $1\frac{1}{2}$ lb. to $\frac{3}{4}$ lb. per sq. ft.

All houses were steamed to 180° F. before emptying, without improving the situation. One nursery was closed. It was decided that the manure was too wet and it was made drier, without effect. There were no intervening good crops. After a general clean-up, crops improved to 1 lb. and then to $1\frac{1}{2}$ lb. per sq. ft. but then they started to fall again. Increased ventilation and drier conditions seem to improve things. Mr. Griffiths suggests the trouble is due to a gas given off by the beds, and that too much water when making up the stack is a factor. During the period in question composting was reduced to 8 days, which at first gave good results; then yields fell and all the summer (1957) composting has lasted 21 days.

Greyness of caps in the early stages was very characteristic. Mr. Griffiths suggests experiments to establish whether browning disease can be transmitted.

S. MIDDLEBROOK, Selby, Yorks.

In March, 1953, the trouble occurred in two houses at opposite ends of the farm, and ran right through these houses. The next year it occurred again, but only in isolated rings which did not spread throughout a shelf. The spreading "wipe out" form of disease has not recurred. Mushrooms in these rings turn grey, then darken to dark brown, and then rot. Several whole shelves have been affected with various malformations, usually dying, but where these occurred in the browning rings these malformed mushrooms also turned brown. The malformations did not appear to be at all related to the incidence of the Brown disease, as they are said to be on some other farms. Is it all one disease or are there two or more?

R. THOMPSON, West Wittering, Chichester

In 1955, Dr. Sinden said Mr. Thompson had La France disease on the farm. Some of the affected mushrooms were just like Miss Gandy's pictures, and there were also many with tilted caps.

In 1957, the trouble started with mushrooms like Dr. Storey's pictures and again a few had tilted caps. Making the compost very dry had no beneficial effect. When the house conditions were dry and heat on, better quality mushrooms were obtained.

J. E. ADY, Cranleigh, Surrey

He had all the symptoms described, in isolated patches, for many years, but no serious trouble. Now they all occur at once, and yields are down. The watery stem occurs under warm, wet conditions, particularly with extra heavy flushes, and does no harm. There was a sudden change in June.

In January, the composting method was changed from 21 days to 16, the first crop gave 2 lb. instead of the former $2\frac{3}{4}$ lb., and continued similarly until June when it fell to $\frac{3}{4}$ lb. Compost was coming wetter and he was advised to peak-heat a day longer; it was already 4-5 days, and really needed 3-4 days more to dry it out. In hot spell in June he watered walls and floors to cool houses, and continued normal watering on beds. He then found everything was very wet, and stopped damping floors and reduced watering on beds. The compost and casing were both too wet and there was no evaporation.

Miss D. G. GANDY, G.C.R.I., Littlehampton

It is difficult to give a name to so nebulous a disease and it might be regarded as a type of disease rather than a definite one. No pathogenic organism has been isolated. The slimy rot in which affected mushrooms often finish is probably due to conditions and may not be specific to the disease.

Fine spawn disappears from the compost in the top of the bed, but this is not due to any pests. In one case of suspected La France disease it spread 10 ft. along a shelf in 6 weeks, but not throughout the bed. There is probably more than one disease.

Miss D. G. GANDY sends the following notes to amplify the very brief report of her contribution to the discussion.

I have not seen any of these recent disorders now being called 'Brown Disease'; but from the descriptions of it which I have heard I doubt if it is an entirely new condition. Three years ago I am sure that, rightly or wrongly, it would have been called 'La France'.

My comments at Southport were based on the little I had heard about 'Brown Disease' but mostly on what I had seen in my own investigations on disorders to which other names might have been given.

My own view of the problem of these disorders as a whole is that it is impossible at this stage to identify and distinguish between them by their symptoms alone, always assuming that more than one disorder exists.

In these investigations I have tried whenever possible to avoid giving names to these disorders as I think that to do so gives the impression that they are well defined and easily recognised. This may seem confusing to a layman, but I prefer to keep the names as nebulous as the problem until some facts emerge.

1. The brown rot could have two possible causes, environmental or pathological. At the moment I am inclined to think that the majority of these rots are due to environmental conditions. This opinion is based purely on observation. On the other hand, Sinden said that mushrooms with 'La France' disease—'died in a rather soft rot turning slightly brown, but not dark.' Arising from this, has 'Brown Disease' been separated from La France solely on the basis of the colour of the affected mushrooms?

2. Disappearance of the top layer of mycelium. I had two sections of bed brought to me recently in which this had happened. The mushrooms produced were typical of what we should have called 'suspected La France,' a few years ago. I have

seen the same type of mushrooms produced on beds where no deterioration had taken place.

3. The case where the disorder spread ten feet in six weeks was of 'suspected La France' and may not have any bearing on the present problem if it is an environmental one.

4. The Sinden mycelium test was applied to all the outbreaks investigated subsequent to the Brighton conference. No attempt was made to confine the test to those outbreaks most like 'La France'. The variation in vigour and cropping potential is the only tangible result which has yet merged from this investigation, but these cultures were derived from crops showing a wide variety of symptoms.

C. R. RASMUSSEN, Denmark

A disease "called Mummy" in a recent experiment spread along a bed until it reached another spawn, and then stopped. Growers sometimes spawn alternate lengths of bed with two spawns.

B. B. TILL, NAAS, S.W. Province (Bristol)

Crop failures in September could be due to high humidity in August.

For recent quicker cropping more virile spawns must have all metabolic processes speeded up, including production of metabolic water and staling products.

Dr. I. F. STOREY, NAAS, East Midlands (Derby)

Browning disease tends to clear up on two or more farms at the same time. In the chart of N. Cooper's crops, covering a year, low yields occur in several crops together, about 7-14 days after periods of high humidity.

A FURTHER DISCUSSION

A meeting was held on Thursday, 21st November, to collect information on the symptoms, occurrence and possible causes of this disease, particularly for the research and advisory scientists who may be able to investigate its various aspects, and also in the hope that such a meeting would enable them to co-ordinate their individual programmes and avoid unnecessary duplication of effort.

Mr. G. V. Allen explained the objects of the meeting and asked Dr. R. L. Edwards to take the Chair during the discussion. About 10 scientists and 20 growers were present. Each person who had experience or observations of the disease in turn described the symptoms observed, with the particular object of finding out how far these were identical on various farms affected.

Then the evidence and opinions on infection, experiments on transmission, and the effect of changes in environment due to weather conditions or control of ventilation and some other theories were discussed.

There was general similarity of symptoms in all cases, though the two most common, grey caps turning brown, and drumstick shaped mushrooms, did not always occur together; some speakers doubted whether drumsticks and the occurrence of watery streaks in the stalk, both of which were said to occur sometimes, independently of any suggestion of disease, had any specific relation to this disease.

Dr. Sinden's opinion was quoted, suggesting that it was La France disease, and from its behaviour he would expect it to be a virus disease although there was no proof of this.

Miss D. G. Gandy described experiments on transmission of the disease in which yields were reduced after infection from diseased beds, but characteristic symptoms were not reproduced. Growers' observations also suggested that the disease was being transmitted from diseased to healthy crops, but there were other possible explanations of the results obtained and there was no conclusive proof of transfer.

On some farms crops improved and symptoms disappeared when weather or altered ventilation brought more air and drier conditions into cropping houses; some badly affected farms showed little response to conditions and crops were often not fully restored to normal.

Research will continue and arrangements are being made within the N.A.A.S. for mutual consultation by all concerned.

Meanwhile the two main lines of defence for sufferers are a thorough-going disinfection throughout the farm, for which Dr. Sinden had suggested SDNOC, and improvement of ventilation and air circulation in the houses, particularly in mild or warm and humid weather.

The former may be essential on badly affected farms, and those intending to use it should remember that SDNOC is very poisonous and must not come into contact with the skin. There are Ministry of Agriculture regulations about its use.

IT IS "LA FRANCE" say

Dr. J. W. Sinden and Mrs. E. Hauser

Alarming occurrences of a disease, named "Brown Disease" have been reported from English mushroom farms during the past months, causing severe losses of the crops. Dr. Sinden was asked by members of the MGA to come to England for a survey of the trouble. After his return from the USA a meeting was held on 24th October, at the mushroom farm of Mr. G. V. Allen at Bilting, near Ashford, attended—to Dr. Sinden's surprise—by many growers and by staff members of the English mushroom research station and Wye College.

Although the diseased beds at Mr. Allen's nurseries were already over-aged, Dr. Sinden found the symptoms typical of "La France" disease as we have come to recognize them by the experience of the past years. The descriptions reported by those growers whose farms suffered from "Brown Disease" also fit into this picture.

The fact that Dr. Sinden, as well as two growers present at the meeting and familiar with "La France" disease, were convinced that "Brown Disease" was identical with "La France" stirred up a vivid discussion.

Dr. Sinden emphasized the fact that every phytopathologist, familiar with such problems, would agree that the full picture of such a disease as "La France" could not be based on a preliminary descrip-

tion given seven years ago, but that only many observations would show the full range of symptoms. The experiences of the past years have shown that "La France" undoubtedly does not express itself in a few simple symptoms, but that it is a complex pattern of symptoms varying with the conditions under which it occurs as well as upon the time and severity with which it strikes. In some cases killing of the mushrooms starts in the first break and is complete, no mushrooms appearing any more on the beds. In other cases the symptoms appear later, less severe and the yield is only partly destroyed. The grade of distortion and decomposition of the mushrooms varies with the conditions of the beds and the houses, just as would be true for other diseases like bubble for example. As to the extension of the disease on the beds, it can be in relatively small spots only, but great areas can also be affected.

In spite of these variations, however, the symptoms of "La France" are typical and well recognizable, especially to growers who have had "La France" in their plants and who have learned to spot infections in order to act immediately *before* the disease is well established in their nurseries.

As to the cause or explanation of the trouble, a great variety of suggestions were given and the opinions presented at the meeting varied very widely.

Prevalent were the suggestions that the wetness of the manure and the casing material were involved, as well as the use of peat and certain kinds of straw. The relation of the disease to various kinds of cultural methods and growing conditions received special attention, and, finally, the deterioration of the spawn and strains being weakened by over-cultivation was put forward as one of the other causes.

Dr. Sinden, not disregarding the probability of physiological relations, expressed his conviction that they were of secondary nature and that the whole problem was primarily a phytopathological one. He suggested further, as he had already earlier, that "La France" might be a virus infection. At the same time Dr. Sinden emphasized the necessity of intense scientific research to reveal the exact cause and nature of the disease, as he had already said in his lecture on disease control and sanitation two years ago at Brighton. It is a challenge to scientists working in places not related to mushroom or spawn growing because of the infectiousness of the disease. If in this course, however, mainly physiological relations are looked for, ignoring that the problem is a phytopathological one, growers are going to be confused and scientific research delayed.

The identification of the disease by one name or another, however, does not solve the problem of the growers, who must eliminate it from their nurseries. More important from this standpoint is the fact that the nurseries of growers, present at the meeting, having had "La France" disease, are now practically free from it after having used a sanitary programme outlined for them. This programme is neither secret nor new, nor does it consist only in steaming out houses (often

done inadequately) or dipping boards in disinfectants. Already at Brighton it was said that "ordinary sanitation alone has not excluded nor eradicated 'La France' ". As the disease is almost surely spreading from house to house by pickers or other workers, diseased areas should be treated thoroughly to kill all mushrooms in order that nobody need get in contact with them. If growing is done in trays, diseased trays can be eliminated and steamed at once without affecting the whole house. Houses with diseased shelf-beds, however, should be steamed immediately when detected, even before the end of the crop. Special attention to the presence of flies is necessary as it is quite possible that the present outbreak of "La France" in many parts of England is a reflection of the fly problem during this summer. Cleaning up the nursery completely is necessary, leaving no waste from the beds or other possibly infectious material about. In serious cases the surfaces of the floors outside and inside the plant should be wetted with SDNOC (POISON!) once or twice a week. Steaming out of all suspected houses at the end of the crop is, without question, a necessity.

The efficiency of all these measures will depend completely on the vigilance to spot infections very early and to treat them completely and thoroughly. Once the disease is established in a farm, its eradication becomes very difficult.

We must, unfortunately, still state to-day that "until more information as to the cause of this disease is available its control cannot be more specific and we must do more than is probably necessary."

A MODERN MUSHROOM CALYPSO

*The Shelf-tray love affair continues to grow
In this month's Topical Calypso.*

When Patterson wrote a provocative article

Luxmore sifted it, particle by particle ;

Perhaps it'll take a mechanical knotter

For Luxmore's son and Patterson's daughter.

The shelf-tray love affair continues to grow

In this month's Topical Calypso.

Anon.

THE IRISH DISCUSS MUSHROOMS

At a recent conference promoted by the Irish Glasshouse and Market Growers' Section of the Agricultural Association of Ireland, at Dun Laoghaire, Dublin, the lecturers included Miss D. G. Gandy of the Glasshouse Crops Research Institute, Littlehampton and Mr. R. G. Darlington of Messrs. W. Darlington & Sons Ltd., Southcourt Road, Worthing.

Both Miss Gandy and Mr. Darlington strongly emphasized the need for adequate ventilation and the greatest possible attention to hygiene in all aspects of mushroom growing. Miss Gandy said that many growers thought that peat was sterile, but this was not so when peat and chalk or lime were mixed. Mr. Darlington urged growers to produce a good compost and added that one of the main faults in the industry was inadequate ventilation.

IMPLICATIONS FOR INSECT PEST RESEARCH

By Dr. N. W. HUSSEY

Glasshouse Crops Research Institute

The fact that only eighty-two completed forms were received has prevented any very definite conclusions being drawn, but certain points of interest have emerged the significance of which may become evident as research progresses. A comparison between the incidence of the principal pests reported and those published in 1953, following the earlier Yaxley enquiry, is given in Table 1. The apparent increase in all pests, except Collembola, experienced by growers is possibly the result of a greater awareness and interest on the part of growers in pest problems. Severe outbreaks were probably confirmed by experts and the identifications in these cases are possibly more reliable. There seems to have been a significant reduction in severe cases of what many growers referred to as "Fly." (Under this head we have included references to Phorids, Sciarids and "Fly" as it is evident that many growers are unable to separate them satisfactorily). This reduction is presumably due to the more extensive use of insecticides. All growers now apply insecticides, 81% using BHC, 56% DDT, and 67% Diazinon. Severe attacks of eelworms have increased sharply since 1952, although here, too, there is undoubtedly a tendency to associate large populations with primary damage, a conclusion which is by no means certain.

The replies to the question "What do you consider your most serious pest?" reflected the values in the severe occurrence section of Table 1 for each pest except Phorids and Sciarids. Here 35% of the replies suggested that research was necessary, although only 10% had serious attacks, as against 28% each for Cecids and Eelworms. This discrepancy casts still further doubt on the ability of many growers to trace the root cause of their crop losses, and one suspects that damage is frequently attributed to the most obvious organisms present without definite evidence.

Cultural conditions will undoubtedly have a considerable effect on insect populations by alteration of the zones within the compost approaching the optimum for the various pest species. Composting methods may have some influence in this connection and we have therefore separated the techniques into short (7-14 days), medium (14-21 days), and long (over 21 days) composting methods. In Table 2 the incidence of severe attacks following the use of these methods is tabulated. The apparent association between more severe attacks by eelworms and medium duration of composting is possibly significant. The term 'significant' is not used in the strictly statistical sense.

Peak heating methods may be compared in two ways (i) by the period over which the heat was applied, and (ii) the temperatures attained. In practice those growers maintaining heat for longer periods will usually be those attaining lower temperatures. The occurrence

of severe Cecid attacks at farms with short peak heating (Table 3) and those attaining higher temperatures (Table 4) is significant and suggests that some natural competitor is eliminated by more efficient heating. Serious eelworm attacks seem to be uninfluenced by the duration of peak heating but are possibly reduced by higher temperatures.

The period of cropping tends to divide growers into shelf and tray users, but pests apparently do not show much tendency to increase to epidemic numbers despite the difference in time over which the compost has to support mycelium (Table 5).

In general it has been very difficult to assess the correlation between the incidence of insect pests and cultural methods. For instance, abundance of Cecids appeared to be related to numerous other factors: older farms, larger farms, fan ventilation, short composting, high cropping temperatures, removal of spent compost, treatment of boards and trays between crops, were all associated with Cecid attacks. But it should be noticed that all such factors would be indicative of the more experienced grower, who would in turn be more aware of Cecid trouble. Similarly, Cecids appeared to be associated with most major diseases, "La France," Bacterial Pit, *Dactylum*, Yellow moulds, and even Truffle. Again, the more observant grower will notice both pests and diseases. Thus all conclusions of this sort should be regarded as suspicious.

Unfortunately very few growers in the enquiry used soil for the casing layer so that it was not possible to compare the incidence of Cecids between farms using soil and those using peat.

From the viewpoint of progress in insect pest research it is gratifying to record that 100% of the replies intimated a willingness to co-operate with the Institute by providing samples on request. It is hoped to take advantage of this valued response when our knowledge has reached the stage at which we can usefully plan a sampling scheme.

Table 1
Comparison of the incidence of insect pests
between 1952 and 1956-7 enquiries

Pest	Growers experiencing		Pest occurrence causing crop loss	
	1952	1956-7	1952	1956-7
	%	%	%	%
Cecids	33	52	23	23
Phorids, Sciarids	51	66	22	10
Mites	31	42	10	6
Eelworms ..	17	41	16	27
Springtails ..	26	5	5	1

Table 2
Incidence of severe insect attack and duration of composting

Composting Method	Short		Medium		Long	
No. of growers	27		30		21	
	No.	%	No.	%	No.	%
Cecids	5	19	8	27	5	24
Phorids	3	11	3	10	1	5
Sciarids	2	7	0	0	0	0
Mites	0	0	2	7	3	14
Eelworms ..	4	15	14	47	4	19

Table 3
Incidence of severe insect attack and duration of peak heating

Duration of Peak Heating	No peak heating		Less than 3 days		More than 3 days	
No. of growers	9		32		32	
	No.	%	No.	%	No.	%
Cecids	0	0	12	38	6	19
Phorids	1	10	3	9	2	6
Sciarids	1	10	1	3	0	0
Mites	3	33	2	6	0	0
Eelworms ..	2	22	10	31	9	28

Table 4
Incidence of severe insect attack following different peak heating temperatures

Peak Heating Temperatures	Below 130° F.		Above 130° F.	
No. of growers	33		31	
	No.	%	No.	%
Cecids	6	18	10	32
Phorids	2	6	4	13
Sciarids	1	3	1	3
Mites	0	0	2	6
Eelworms	10	30	6	19

Table 5
Incidence of severe insect attack on shelves and trays

Growing Method	Trays		Shelves	
No. of growers	34		40	
	No.	%	No.	%
Cecids	7	20	11	28
Phorids	3	9	2	5
Sciarids	1	3	1	3
Mites	2	6	2	5
Eelworms	9	29	12	30



FOUR MONTHS LATER—AND LESS TOO!

Motor insurance premiums generally were raised substantially on 1st July, last. The NFU "Mutual" not only deferred their revisions to 1st November, but ensured that the increases were as little as possible and substantially less than those of most other insurance companies.

NFU "Mutual" insurance, with the first-class claims and general service that goes with it, is always good value for your money.

Ask the MGA Secretary or your local NFU Secretary for a quotation.



FANCY THAT!

Twenty years after a tarred asphalt surface was put down for use as a car park outside the Woolpack public-house, Norwich, mushrooms are forcing their way through it. *Evening News*

Six months after being invited to apply for 500 free MGA publicity bags some members have just managed to force themselves to make an application. *MGA Secretary.*

Ten months after being officially notified of the increased rate of MGA subscriptions a large number of members are still paying at the old rate until notified of the outstanding balance. *MGA Secretary, Grrh!*

Some months after all Grower Members have been invited to pay their annual subscription by Bankers' Order (many have done so for years) only one of those invited has changed. *MGA Secretary, Grrh! Grrh!*

WORLD'S PRESS DIGEST

Mushrooms are still doing their up and down trade (*Grower*, October 5/57). Mushrooms arrived in large quantities but were slow (*Nurseryman Seedsman*, October 10/57). Mushrooms were doing a fair trade, meeting the heavy supplies well (*Nurseryman Seedsman*, October 17/57). Mushrooms enjoyed only a fair trade for heavier arrivals (*Nurseryman Seedsman*, October 24/57). There was a very poor demand for mushrooms and, unfortunately, quantities were much heavier (*Nurseryman Seedsman*, October 31/57).

Continental growers manage to effect an *apparent* price reduction by selling stalks and all which, once the housewife got used to it, might do much to push up mushroom sales.

Alec Blacke in *Fruit Trades' Journal*, October 12/57.

An undesirable practice which seems to have recently been adopted by the mushroom-growing industry consists in selling mushrooms with enormous stalks, so that the actual content of the mushrooms is often not more than about half of total weight. If it continues, it will do great harm to the mushroom industry I suggest that there should be some form of standardisation of stalk length.

Prof. S. C. Harland in *Grower*, November 2/57.

Most of the growers are just eking out a living with average good luck and by living on their depreciations. He doesn't have sufficient revenue during his average years to build up a reserve for the bad crop year. Since the major portion of mushrooms grown are canned, it would seem that a firmer price from the processor would help balance the budget. Editor of AMI's *Mushroom News*, September/57.

Dr. L. G. Bennett, of Economics Department of Reading University, said there were two principal forces contributing to the development of pre-packaging: firstly the growth of self-service and the consequent demand for "unitised" goods; and secondly, the most important, the development of the plastics industry, which was actively seeking new markets for its produce. *Fruit Trades' Journal*, October 26/57.

Mr. E. H. Gardener, chairman of the NFU Central Horticultural Committee, speaking in Suffolk, gave as his personal opinion the view that deep freeze rather than pre-packing would revolutionize the pattern of horticultural production within the next 10 or 20 years.

Commercial Grower, November 1/57.

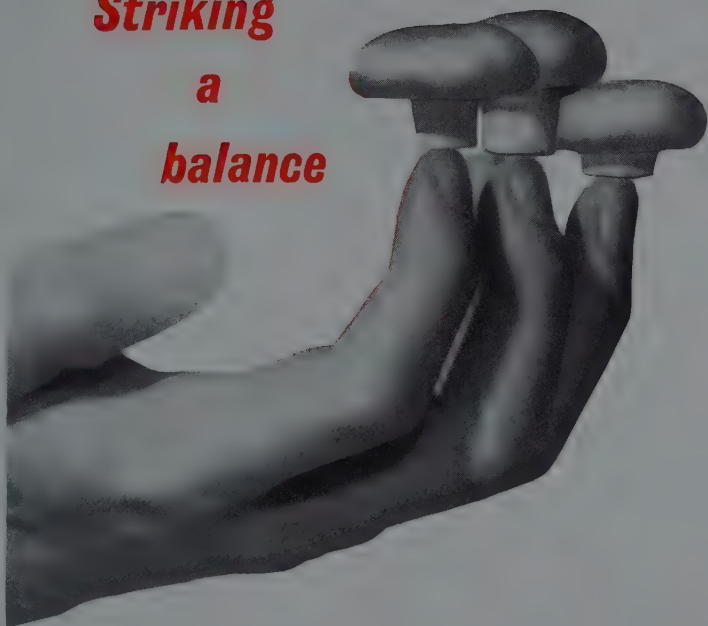
Consumer acceptance of pre-packaged produce is growing, a new duPont survey of buying habits shows. Some 52% of 2,000 homemakers said they preferred pre-packaged produce, up from 45% in 1950. The more favourable attitude of consumers towards pre-packaged produce is attributed to the efforts of retailers to package only top quality.

AMI's *Mushroom News*, September/57.

It is hard not to believe that many supermarket patrons must think back wistfully to the days when one went into a grocery store and simply asked for things.

"Letter from America" in *Daily Telegraph*, October 15/57.

***Striking
a
balance***



From one expert to another.
You have the special skill and knowledge
needed for growing high-quality mushrooms.
We have the knowledge of marketing and
distribution obtained through year of
development and application. Put the
two together and you get the best mushrooms
sold in the right place at the right price.

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Bait stations (for the control of house flies) were prepared by stapling wooden tongue depressors to absorbent paper coasters. The latter were soaked in a honey, sugar or chocolate bait with 2% of insecticide. When used against house flies on farms, etc., these bait stations, containing Bayer L13/59 or malathion, gave excellent control providing sufficient stations were used and sanitation was at least fair.

J. C. Keller, H. G. Wilson & C. N. Smith in *Journal of Economic Entomology*, 49, 1956. (Abstract in *Journal of the Science of Food & Agriculture*).

Private trading companies may be subject to surtax where "the company has failed to distribute a reasonable part of its income from all sources, having regard to the current requirements of its business and to such other requirements as may be necessary or desirable for the maintenance and development of that business."

Business, October/57.

Tunis N66 mushroom insecticide is being used in the USA with a fog gun. The gun is placed in the centre of a house, and the motor is said to force dry fog into every crack in five minutes, at a cost of about 5s. The gun costs about £35 from Tunis Bros., Kennett Square, Pennsylvania.

Grower, October 5/57.

Mushrooms are a delicacy that many gardeners miss growing because they're afraid they are too difficult. In fact, once you get the right conditions you can't STOP them growing!

Bill Sowerbutts in *Sunday Graphic*, October 6/57.

The story of the Merry Orchard Mushroom Farm, Whiteparish, Wiltshire, is told in two pages. Mr. Bernard Collins, the manager, tells of changes he has made. Under the old 12,000 sq. ft. shelf system, ten full-time workers, one casual, average yearly crop 33,000 lb. At present, 9,000 sq. ft., half trays, half shelves, four part-time women, one casual and himself, 66,000 lb. recorded last year. "The future programme," he says, "is 16,000 sq. ft. of trays, with the same staff, and I expect to average 130,000 lb. of mushrooms per year."

Commercial Grower, October 11/57.

Monsieur Guiochon's firm, Somycel of Mesnil, producers of mushroom spawn in France, is doing research on the deterioration of spawn strains after they have been in use for some years. Every year, new strains are used, and since even the spores of a single mushroom give varying results, he propagates always from a single spore, selecting the heaviest and most even croppers.

Grower, October 12/57.

"Air changes in the house are something of a red herring," said Mr. P. B. Flegg, of the Littlehampton Glasshouse Research Station, speaking in a discussion at Southport on Brown Disease. "We are interested in the two inches of air just above the casing soil."

Grower report, October 12/57.

Tumour-inhibiting materials are present in water extracts of fruiting bodies of the mushroom *Boletus edulis*. Attempts to grow *B. edulis* in vitro have been successful, but no tumour-inhibiting material

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has been produced by the mycelium. The mycelia of several other basidiomycetes grown in submerged cultures appear to have produced tumour-inhibiting principles.

E. H. Lucas, R. L. Ringler, R. U. Byerrum, J. A. Stevens, D. A. Clarke and C. Chester Stock (Michigan State University), in *Antibiotics & Chemotherapy* 7 (1), 1957.

Need for research on spawn strains was raised by Mr. Fred. Atkins in a paper read to the MGA Conference at Southport. The suggestion gains added point from Miss Gandy's evidence of the possibility of genetic differences in spawn strains. *Grower*, October 5/57.

The search for effective wood preservatives continues. A two-stage diffusion process called double diffusion, developed at the Forest Products Laboratory, is giving promising results in field tests. The process consists of soaking green wood in two separate solutions of chemicals that diffuse into the wood and there react to deposit a toxic precipitate. R. H. Baechler (Forest Service, U.S. Dept. Agric.) in *Applied Microbiology* 4 (5), 1956.

Since so many of the field mushrooms are riddled with "maggots" they cannot assist in the gaining of even one customer for cultivated mushrooms! Individual growers might find it worthwhile to approach their local retailers and point out that cultivated mushrooms are offered pest free. There may well be a clean food regulation to cover this point, particularly where grossly infested foods are concerned.

Martin D. Austin in *Commercial Grower*, October 25/57.

The effects on the soil fungal population of steam, formalin and acid treatments applied to an old forest nursery soil are reported from Rothamsted Experimental Station. The soil partially sterilized with formaldehyde was quickly re-populated with a species of *Trichoderma*. The mould was tolerant to 0.1 per cent. formalin. One strain in fact grew better on water-agar+0.02 and 0.04 per cent. formalin than on plain water-agar.

Janet E. Mollison in *Transactions of the British Mycological Society*, 36, 1953.

Samples of mushroom compost infested by nematodes were exposed to gamma-ray irradiation from cobalt-60 at a dose rate of 120 rep/minute. The samples received doses of 6,000, 12,000, 24,000, 48,000 and 96,000 rep on 17th January, 1957. The inactivation dose for *Ditylenchus destructor* and the *Rhabditis* spp. examined appears to lie between 48,000 and 96,000 rep, more than twice as great as the 10,000 and 20,000 r. found to inactivate cysts of potato-root nematode (*Heterodera rostochiensis*).

F. C. Wood and J. B. Goodey in *Nature*, October 12/57.

Early summer cauliflower, carrots and leeks were tested on various bulky organic manures, and spent mushroom compost has given the best results since the start of the experiment in 1953 at Stockbridge

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Dear Sirs,

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You will be aware that I have now spawned regularly with your Mount White, both Moist and Granular, for close on two years and during this time have used many hundreds of cartons. We grow in the standard Danish fish box (composted stable manure) and crop for six weeks. Over a period of twelve months we have averaged 1.9 lb. per sq. ft., several crops exceeding 2 lb., and latterly it has been the exception rather than the rule to crop less than 2 lb. In fact our best crop recently has done $2\frac{3}{4}$ lb. As a point of interest, this has occurred since we adopted your suggestion of spawning with 25% of your White Grain, in addition to the Moist White manure spawn.

An outstanding feature of our cropping has been the really excellent quality of mushroom produced. We are delighted with the results and you may use this tribute as you wish.

Yours faithfully,
(signed) A. Sanford.

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House. Two factors will be examined in future years: BHC used in mushroom cultivation taints the carrots, and the chalk used with peat in the casing is producing a lime build-up. There is already enough evidence to prove that spent compost is valuable on selected crops, and on some it produces not only heavier yields, but more regular plant growth.

H. G. Schaffer in *Grower*, October 26/57.

No industry that dares to call itself efficient can ignore the problem of recruiting and training youth.

Laurence Easterbrook in *British Farmer*, October/57.

It appears that this will be a record season for mushrooms grown under glass as a catch crop (in the Lea Valley), judging by the number who have decided to try a small flutter. Manure merchants report a heavy demand for stable manure.

Grower, October 26/57.

As an effective grower organisation, the MGA is without a peer.

Martin D. Austin in *Commercial Grower*, October 25/57.

The biologist always seems to be looking through an infinite recession of mirrors within mirrors, and his knowledge is always the genesis of new "mystery."

Sir Solly Zuckerman in *Sunday Times*, October 13/57.

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Nurseryman, *Seedsman & Glasshouse Grower*, 62 Doughty Street, London, W.C.1.
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Phytopathology, Monumental Printing Co., Baltimore, Maryland, USA.
Produce Packaging, Agriculture House, Knightsbridge, London, S.W.1.
Safety Equipment & Industrial Clothing, 9 Gough Square, Fleet Street, London, E.C.4.
Soil Science, The Williams & Williams Co., Baltimore 2, Maryland, USA.
Transactions of the British Mycological Society, Cambridge University Press, Bentley House, London, N.W.1.

If the journals referred to are generally available, they are most easily obtained by placing an order with your bookseller or stationer.

FACTS

A GROWER SHOULD KNOW

It is only a few years since SHIRLEY ACTIVATOR M was first put on the market. At that time it had been given crop tests under widely different growing conditions—as a so-called synthetic and as an additive to stable manure—on shelves and trays. Since then several thousands of tons have been used and the present rate of sales is higher than at any time. Although SHIRLEY—M may be young the technical experience behind it is considerable. It is backed by a first-class laboratory in the control of fully qualified men and is made in a works second to none in efficiency. We have introduced many other products after similar type tests and backed by the same scientific knowledge and production skill. These too are gaining in popularity and usage.

Next Spring we shall introduce further new products. The prospective user of these and any other SHIRLEY product can have every confidence in them. Our products are now being used in places so widely separated as Australia, Ascension Is., Channel Is., Continental Europe and all parts of the British Is., and Eire.

Remember therefore that SHIRLEY products are all CROP TESTED: LABORATORY TESTED AND CONTROLLED: BLENDED IN THE FINEST MACHINERY KNOWN: MANUFACTURED UNDER THE PERSONAL MANAGEMENT OF FULLY QUALIFIED MEN and sold by representatives who have both technical and practical training.

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STEMS AND PIECES

By Joseph M. Michaels, Naperville, Illinois, U.S.A.

17. Over the summer the writer of the "Stems and Pieces" has chanced upon bits of whimsy and humour; and he has gleaned a fact or two—all of this he would like to share with his reader. But the wisest remark to take to heart was an answer to question by a fellow grower as he was diligently watering his beds. Asked I, "should mushroom beds be allowed to dry somewhat between flushes so that air is admitted to the compost and thus shorten the interval between flushes; or, will flushes be hastened if the beds are kept constantly soaked?" He shut off his water, looked up and answered admonishing—"Why do you have to start creating problems where there was none before?" A very sage answer I must admit.

18. After the mushroom industry course at Penn. State University a number of growers promptly made off for the race track in Maryland. Observed one chap: "you know," said he, "Mushroom growers are a consistent people. During the hot summer they bet on a horse's head and during the rest of the year they bet on the other end of the horse."

19. There is a grower nearby who fills his houses at night to get away from the high daytime heat. He was looking for a filling crew to fill his fourth house. They were skilful with the filling operation and well experienced, but apparently misunderstood the scheduled day for filling. While this grower was peacefully sleeping they came Saturday night, and by morning the house was filled. On Sunday morning the grower was amazed when he saw that the large manure pile in front of the mushroom house had disappeared. It could only happen to a mushroom grower. The manure was green, uncomposted and would not be ready for a filling for a long time. To console him, I requested for him a membership to the English MGA. So we welcome grower Leon Maniocha.

20. Conspicuously absent at the Mushroom Industry Course at Penn. State were two spawn makers whose spawn did very poorly.

21. Spawn is regarded as the greatest variable in the industry today. The maker of Spawn A ("Stems and Pieces" 16) repeated his capacity for undependability. This time his spawn did not produce woody mushrooms and open veils. It just didn't grow. It fuzzed up around the grain, turned brown in the centre and died. An occasional bottle of spawn did grow to produce a desultory crop. I would feel sorry for the spawn maker if this defective performance from a bad spawn occurred simultaneously throughout the industry. Crop failures from his spawn occurred throughout the country for over a period of at least six months. The total dollar and cent loss must have been fabulous. To be fair to the spawn maker there was in the Chicago area one excellent crop (two singles) grown on his spawn. All growers observed that an occasional carton was good amongst the many defective ones. It was very easy to see where a good bottle of spawn would start and end on a mushroom bed. In fact it was dramatic. But

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this spawn maker explained it this way. Mushroom growers want spawn to look lush, and fuzzed up and white when they receive it. So that spawn would get to look that way, it was kept in the growing room a bit too long, and the bottles in the middle of the growing racks got over heated. By the way, he also rolls the grains in chalk dust to make them white!

Does any grower buy grain spawn because it appears nice and white in the shipping container? How out of touch must this spawn maker be with the industry. I am sure that we have more confidence in spawn when its white appearance is not due to a deceptive coating of calcium carbonate. And who is glad because a spawn was permitted to fuzz up in a shipping container? And finally this spawn maker blames the 'kafir' corn used for the carrier. If 'kafir' corn could only talk, it would tell the spawn maker that he needs some orientation.

22. How unfair this last "Stem and Piece" seems? There are spawn makers whose spawn is consistently dependable. To-day I have called three different spawn makers to order spawn. The demand for spawn is so great that each one's supply was temporarily exhausted. I don't think this has ever happened before. You see, the unreliable spawn maker is the cause of all this. They had to absorb his orders too! One firm was over-sold for six weeks later. Another firm said that they could ship my spawn in three or four days. They could have transferred the spawn from a growing container to a shipping container and shipped it out a few days prematurely. But they didn't. A reliable spawn maker has many earmarks to distinguish him.

23. It is interesting to note that some strains of spawn are compatible and grow well together in the same bed. Other strains are incompatible. They yield poorly when growing together. I can see tremendous advantages in growing two compatible strains in the same bed. If we should plant two spawns (half of the necessary amount of each) in the same bed, I could see the following advantages:

1. If one spawn fails because the spawn maker failed, the other spawn will take over and yield an average crop.
2. The environmental variables during cropping may at certain times favour one spawn and at other times favour the other spawn. We could thus maximize production from a given compost.

Lest we be carried away, I know of a large grower who was completely fascinated with the idea of planting two strains in the same bed. He thought that the two strains, if planted several days apart, and with excellent temperature control during spawn run, would each produce a flush during cropping at alternate times. He reasoned thus, that the interval between flushes would be cut in half, and he would have twice as many flushes in a cropping period. But alas, the flushing mechanism does not work like that. Both strains flushed at the same time.

24. The advantages of planting two strains could be achieved, I think, if we could ascertain which strains are compatible. Compatibility could be easily observed on a Petri dish. But there would

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have to be a central clearing house to number and identify the numerous strains. And who knows how many times the spawn maker assigns a new number to the same strain? And two spawn makers could sell the same identical strain, each identifying it with a different number. Yes, there could be a system to identify all the existing strains for the industry. It would sometimes be well to know which are compatible.

25. What happened to Stanley Middlebrook's "Pinheads"? They are certainly missed.

26. Dr. Lambert in his paper, "Ventilation Requirements for Cultivated Mushroom," June, 1957, suggests that the mushroom mycelium growing in the bed and in the casing layer gives off an unsaturated hydrocarbon gas, possibly resembling ethylene gas. This is apparently nature's mechanism for preventing the caps from being formed underground. How tremendously interesting the casing layer must be!



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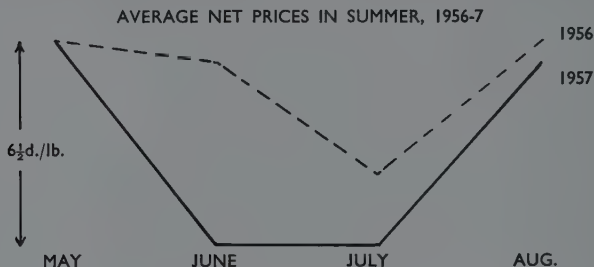
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CORRESPONDENCE

Letter to the Editor, *MGA Bulletin*

Dear Sir,

The Times devoted a third of a column to Brown Disease on 22nd November. It "threatens the livelihood of thousands of growers in Britain," it stated. "Because of the gradual reduction of supplies, however, mushroom prices have been so firm that the seasonal summer slump was hardly noticed this year." The "thousands" of growers who experienced this June and July's prices will challenge the "firm" suggestion. My little graph supports their challenge. **Fred. Atkins.**



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Darlington, R. C., Hastingwood, Harlow.
Duthy, R., Greenacre Graded Mushrooms, Little Horkesley.
Everard, A. V., Whyteaway, Basildon Road, Laindon.
Gibbons, J. S., Takeley Nurseries Ltd., Takeley.
Griffiths, A. W. F., "Melcot," Main Road, North Fambridge, Chelmsford.
Harvey, B. H., Principal, Essex Institute of Agriculture, Writtle, Chelmsford.
Hawke, John A., Cramps Farm, Barling Magna, Gt. Wakering.
Hopping, C. H., Pick Hill, Waltham Abbey.
Jones & Son, H., 86 Station Road, West Horndon.
Kilian, H., Baddow Park, Gt. Baddow, Nr. Chelmsford.
Knights, Alan D., 16 Oaklands Avenue, Romford.
Layer Mills Ltd., Layer de la Haye, Colchester.
Littler, W. C., Tylers, North Weald.
Maywick Appliances, High Street, Wickford.
Newman, G. H., "Pantiles," Stane Street, Takeley.
Pan Britannica Industries Ltd., Waltham Abbey.
Parsons, Mrs. R. L., Great Braxted Hall, Witham.
Paton, J. Stuart, "Millers," Takeley, Nr. Bishops Stortford.
Payne, C. W. & Sons Ltd., Blacklands Nursery, Nazeing.
Pinkerton, R. H., Ltd., Lubard's Lodge, Hullbridge Road, Rayleigh.
Sancewicz, Z., Radwinter Mushroom Farm, Radwinter, Saffron Walden.
Simons, J. E. R., Natts Farm, Harlow.
Simons, R., Checkmate, Commonside, Potter Street, Harlow.
Speller, R. L., Hoe Lane, Nazeing.
Stark, John, "Bothways," Roydon, Harlow.
Tennisdene Nurseries, Ramsden Park Road, Ramsden Bellhouse, Billericay.
Triangle Nursery Ltd., Rowney Farm, Harlow.
Trimby & Sons, L. W., Applewood, Blackacre Road, Theydon Bois.
Ward, G. C. P., Lime House Nursery, Rayleigh.
White, E. T. W., Wendy, Berechurch Hall Road, Colchester.

FINLAND

Kjeldsen, J. M., Viralan Kartanon, Turenki.

FRANCE

Blancs Francais de Semis le Champion, 37 Rue de Dijon, Bordeaux.
Blauchaud, Boite Postal, No. 4, à Chacé, Maine et Loire.
Chaumette, R., 19 Route du Grand Pont 19, Le Vesinet, (S. et O.).
Desnoues, Yves, La Tour de Salvagny, Rhône.
Guiochon, P., Mesnil-le-Roy, (S. et O.).
Juvin, R., 42 Rue d'Alsace, Saumur.
Loyant, Michel, Longué, (M. et L.).
Mouton, G., Exploitation de Castelculier, B.P.I Lafox, Lot-et-Garonne.
Nail et Fils, Chançay, (Indre et Loire).
Peyronnet, Ets. Barbier, 1 Rue de la Tranchade, Angouleme, Charente.
Stassin, Charles, Chateau de St. Germain, St. Jean, St. Germain (Indre et Loire).

GERMANY

Abel, Wilhelm, Katzenstein (Harz), Ober Osterode (Harz).
Baumann, Joseph, Champignonsucht, Lipburg b. Badenweiler, Offenburg i. Bd.
Dietrich, Lothar, Burggarten 1, Hamburg 26.
Greve, Wolfgang, Hambuehren, C'elle, Nr. Hannover.
Hullen, Eric, Erlangen.

GERMANY—*contd.*

Hunte, W., Epi, Hannover Linden, Postfach 144.
Kendermann, Hermann, Wiesbaden, Webergasse 7.
Mantel, Dr. Erwin, Rheingar—Champignons, Wiesbaden, 79 Adelkeidstrasse.
Maxplanck Institut Für Zuchtungsforshung, Abt. F. Kulturpflanzenzuchtung,
Hamburg-Volksdorf, Waldredder 4.
Mende, A., Champignon-Kulturen, Berlin S.W.29, Hasenheide, 22.
Rempe, Dr. H., Meisenburgstr 97a, Essen-Bredeney.

GLOUCESTERSHIRE

Bateman, W. V., Parkwell Nurseries, Wellsbridge, Nr. Bristol.
Butchers & Lavercombe, The Mushroom Farm, Oxtalls Lane, Longlevens.
Gamble, A., Southfield House, Forthampton.
Lewis, C. B., Lee Mount, Hillcrest Road, Redcliffe Bay, Portishead, Bristol.
Rowley, J. D., Kingsheath Nurseries, Cribbs Causeway, Nr. Bristol.

HAMPSHIRE

Baring, J. T., Longmead Brickworks, Bishopstoke, Eastleigh.
Bell, Mrs. M. Mortimer, Newnham Hill, Nr. Basingstoke.
Bowditch, A., 82 Cumbrian Way, Millbrook, Southampton.
Arthur Coomer Ltd., Grove Road, Farlington, Portsmouth.
Dring, J. Ltd., The Airport, Portsmouth.
Green, J. D., Hill Top, Swanmore, Southampton.
Hassell, E. T., Branksome House, Waltham Chase, Southampton.
House, Charles, Haydown House, East Cholderton, Nr. Andover.
Huntington, J. R., Rockbourne, Nr. Fordingbridge.
Lawrence, Capt. G. P., Barrow Hill, Goodworth Clatford, Andover.
Livingstone, F. G., Hearn House Farm, Headley, Borden.
Rooke, Dr. A. R., Beechcroft Nursery, Four Marks.
Townsend, H. C., 118 London Road, Cowplain, Portsmouth.
Walden, R., 7 Richmond Gardens, Southampton.
Warwick, R. G., Wickham.
Waterhouse, Lt.-Cdr. J. H., AIB2, Royal Naval Air Station, Gosport.
Watts, J. R. W., Greenleaves Farm, Fordingbridge.

HAWAII

Deisseroth, R. H., 671 Old Mokapu Road, Kailua, Oahu, T. Hawaii.

HEREFORDSHIRE

Curtis, G. E., Cwm Bach, Glasbury.
Godfrey, P. F., Wanatchee Products, Much Birch, Hereford.

HERTFORDSHIRE

Adco Ltd., Harpenden.
Atlas Basket Co. Ltd., Atlas Works, Harpenden.
Allen, R. L., Rockwood Nurseries, Shepreth, Nr. Royston.
Bruce, H., 5 Gews Corner, Cheshunt.
Campbell, A., Rocam Nurseries, Bushey Heath.
Clarke, J. W., Oakwood 1a, Monkwood Avenue, Waltham Abbey.
Combe, T. W., Ltd., Scatterdells, Chipperfield.
Cox, J. C. Faringdon, Townsend Farm, Harpenden.
Dean & Speller, Conduit Lane, Hoddesdon.
Goodchild, R. D., Ramerick Nurseries, Bedford Road, Holwell, nr. Hitchin.
Hadland, J. & Co., Chipperfield.
Hagger, C., The Maples, Melbourn, Nr. Royston.
Hall, W., Floral Farm, London Colney.
Hunt, N. R., Providence Nursery, Ware Road, Hoddesdon.
King, Geo. W. Ltd., Argyle Works, Stevenage.
Knight, J. R., "Dukes," Allen's Green, Sawbridgeworth.
Mawby, W. H., 143 Newgate Street Road, Goffs Oak, Cheshunt.
Monro, Geo. Ltd., Technical Dept., Waltham Cross.

HERTFORDSHIRE—*contd.*

Murphy Chemical Co. Ltd., Wheathampstead, Nr. St. Albans.
Standard Range & Foundry Co. Ltd., Queens Road, Watford.
Tucker, W. C., Hobach Farm, Wimpole, Nr. Royston.
Ward, D. E., Tom's Hill House, Aldbury, Tring.
Watson, Angus, The Beehive, Meesden.

HOLLAND

Boogerd, J., Steynstraat 41, Arnhem.
Bos, P., P.A. Gez., V.D. Linden, Schoolstraat 16, Venraay.
De Kleermaeker, Miss E. Schonten, Dokter, Niemetjerstraat 59, Wageningen.
Derks, G., Hoogstraat 28A, Overasselt.
Hendrikx, L. J., Lambertuslaan 3, Swalmen.
Meyer, A., Kwekerij Landgoed "De Rosep," Oirschotsedijk, D. 386 A, Oisterwijk (N. Br.).
Proefuin, Noord-Limburg, Tilmanskampweg 1, Venlo.
Segboer, L. S., Storm 3, Wassenaar.
Van De Sandt, J., Heydenryckstraat 72, Nijmegen.
Woltman, J. P. H., Kalwykscheweg 22, Wassenaar.

HUNTINGDONSHIRE

Knighton, E. A., Orchard House, Wennington, Abbots Ripley.
Spiller, A. J., Hawthorn Lodge, Gt. Staughton.

HUNGARY

Heltay, Imre, 129u, E/27, 111/14, Budapest.
Koronczy, Imre, XVI Baross Gabor ut 15, Matyasfold, Budapest.

INDONESIA

Haden, T. p/a R. T. Braakensiek N.V., Djalan Gadjah Mada 84, Djakarta, Java.

ISLE OF MAN

Robinson, S/Ldr. H. J., Lynvale, W. Baldwin, Marovin.

ISRAEL

Kohn, S., Kvuzat Mazuba, Doar Na Galilmaaravi.
Reichert, Prof. J., Division of Plant Pathology, Agricultural Research Station, P.O. Box 15, Rehovoth.

ITALY

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da Schio, Count Alvise, Villa da Schio, Costozza di Vicenza.
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KENT

Allen, George V., Bilting Cottage, Bilting, Ashford.
Allnutt, Frere, Palmsted Hill House, Bekesbourne Lane, Nr. Canterbury.
Atchison, Mrs. Barbara, "The Remains," Throwley, Faversham.
Barber, Capt. W., "Winchelsea," New Street, Ash, Canterbury.
Brown, A. B., Kingscote, Lusted Hall Lane, Tatsfield.
Britcher, R., Little Court Lodge, East Farleigh, Maidstone.
Bugge's Insecticides Ltd., London Road, Sittingbourne.
Collier, Sir Conrad, Fairbourne Manor, Harrietsham.
Collier, J. C., Fairbourne Manor, Harrietsham.
Cooper, Frank (Canterbury) Ltd., 2 Watling Street, Canterbury.
Dredge, Major A. L. A., Combe House, Combe Bank, Sundridge.
Field, Lt. Col. N. J. L., Fair Acres, White Hill, Bilting, Nr. Ashford.
Fort Darland Mushroom Farm Ltd., Gillingham.
French, P., & Sons, Batteries Farm, Lynsted, Sittingbourne.
Gook, E. A., Hegdale Cottage, Boundgate, Badlesmere, Nr. Faversham.
Hall, A., Riversdale, Lyminge.
Harding, Noel D., Inglewood Guest House, St. Michael's, Tenterden.

KENT—*contd.*

Harding, W. A. B., Stone Lodge Farm, Tenterden.
Holmes, T. P., Biggin Farm, Challock, Ashford.
Hope, David A., Plane Trees, Waternill, Benenden.
Huntington, J. R., Glebe Croft, Harrietsham, Nr. Maidstone.
Jackson, R. L. O., Park Cottage, Doddington, Sittingbourne.
Knight, J. P., Isla-Vale, Vigo Hill, Trottiscliffe, Nr. W. Malling, Kent.
Lloyd, Lt. Col. C., Berengrove, Berengrave Lane, Rainham.
Mason, W. G., Ashford Road, Harrietsham.
Mid-Kent Nurseries, Ashes Lane, Hadlow, Nr. Tonbridge.
Moreton, B. D., N.A.A.S Olantigh Road, Wye, Ashford.
Mount, E. H., Pembroke Lodge, Dover Road, Walmer.
Oldfield, J. R., Doddington Place, Nr. Sittingbourne.
Pannell, Gray & Sons Batteries Farm, Lynsted, Sittingbourne.
Smith, E., Woodville, Challock.
Smith, E. N., Plantation House, Rhode Common, Faversham.
Smith, G. C., Loddington Farm Ltd., Linton, Maidstone.
Stanford-Tuck, Mrs. J., The Lynch, Eastry.
Stanford, R. G., Revel Lodge, Molehill Road, Chestfield, Whitstable.
Stedall, G. St. G., Shearway Nurseries, Cherry Gardens, Folkestone.
Stevens, G. C., Hollytree Lodge, Rodmersham Green, Sittingbourne.
Tenderden Mushrooms Ltd., The Nurseries, Stone Lodge Farm, Tenterden.
Turpin, D. F., Tutty's Farm, Matfield.
Vyse, W. J., Foxden Lodge, Egerton, nr. Ashford.

LANCASHIRE

Aspin, J., 15 Old Field Carr Lane, Hardhorn, Poulton-Le-Fylde.
Beardsell, D. R., 6 Cable Street, Formby, Liverpool.
Blackburn (Manchester) Ltd., James, Smithfield Market, Manchester 4.
Bleazard, F., Messrs. C. Bleazard & Son Ltd., Cornwall Place, Blackpool.
Bleazard, J. A., Messrs. Mereside Mushroom Co., 21 Cornwall Place, Blackpool.
Bradley, K. C., Lodge Lane Nurseries, Lytham.
British Basket & Besto Co. Ltd., Irlam, Manchester.
Cocozza, Wood (Manchester) Ltd., 21 Oak Street, Smithfield Market, Manchester 4.
Coates, Fred., Rivelin Nurseries, Course Lane, Newburgh, Wigan.
Collins, Gordon Ltd., 23 Queen Square, Liverpool 1.
Conroy, P. J. Ltd., Hope Street, Wigan.
Davey, T. W. Ltd., Smithfield Market, Manchester 4.
Faulkner, H., Brent Mead, Firwood Road, Lathom.
Filmer, W. W., Flying Officer, Officers Mess. Medical Training Establishment, R.A.F., Warton, Nr. Preston.
Fitzpatrick, P. & T. Ltd., 22 Queen Square, Liverpool 1.
Garner, W. R., Ridgmont Mushrooms, Moss Lane, Hesketh Bank, Nr. Preston.
Gleave, D. B., 113 Downall Green Road, Bryn, Nr. Wigan.
Higgins, William, Ivy Cottage, Moss Lane, Lathom, nr. Ormskirk.
Holcroft, Thomas, Moss Villas, Mere Road, Burscough.
Hopkins, B., c/o Mr. F. Morrell, 145 Enston Road, Morecambe.
Houghton, J. & Sons, Winrow Farm, Scarisbrick, Ormskirk.
Howlett, T. & Co. Ltd., Strand Buildings, Cleveleys.
Hunt, John, Torr's Farm, Walmer Bridge, Nr. Preston.
Ibbotson, D. R., 41 Station Road, Hesketh Bank, Nr. Preston.
Kay, Wm. C., Old Brook Hall Farm, Bold, Nr. Widnes.
Kipling, Walter, Kipling's Nurseries, Lees Lane, Neston, Wirral.
Lawton, R., Messrs. Lawton Bros., Oulderhill Nurseries, Taunton Ave., Rochdale.
Lewis, David J., Anfield Lodge, 13 Anfield Road, Liverpool 4.
Martland, R. G., Burscough Bridge, Ormskirk.
Mereside Mushroom Co., 21 Cornwall Place, Blackpool.
Mrs. Mulligan's Mushrooms Ltd., 1 Harcourt Road, Blackpool.
Olverson, N., Kershaws Farm, Smithy Lane, Scarisbrick, Nr. Ormskirk.
Orritt, T., 48 Orrell Lane, Burscough Bridge, Ormskirk.

LANCASHIRE—*contd.*

Paton, Major J. R., 12 Lentworth Drive, Scotforth, Lancaster.
Redgewell, G. E., 20 Hawksworth Grove, Morecambe.
Rothwell, J. & Son, Little Hall Farm, Cottage Lane, Ormskirk.
Trickett, R., 75 Parkinson Street, Mill Hill, Blackburn.
Turner, H., 17 West View, Kelbrook, via Colne.
Watson, H., Rowe Farm, King's Causeway, Brierfield, Nr. Nelson.

LEICESTERSHIRE

Hewett, Ivor, 12 Greenclose Lane, Loughborough.
Marigold Nurseries Ltd., Great Bowden, Market Harborough.
Musson, R., Poplars Farms, Kirby-Bellars, Melton Mowbray.
Pratt, C. S., 11 Scotlands Road, Coalville.

LINCOLNSHIRE

Broomhead, Philip, 8 Fulney Estate, Spalding.
Cuttins & Sons, James, Stamford, Lincs.
Marshall, S. E., The Mill, Butterwick, Boston.
Titley, J. D., Ludford, Lincoln.

LONDON

Adam, F., 22 Pickering Street, Essex Road, N.1.
Agricultural & Chemical Products Ltd., 51/52 Barbican, E.C.1.
Bermondsey Mushroom Partnership, 18-26 and 30-42 Maltby Street, S.E.1.
Bicknell, David T., 6 Findon Road, Shepherds Bush, W.12.
British Rototherm Co. Ltd., Merton Abbey, S.W.19.
Broome & Green Ltd., Covent Garden Market, W.C.2.
Castle, J., Messrs. Bowater-Eburite Ltd., Park Royal Road, N.W.10.
Celcure Ltd., Aldwych House, Aldwych, W.C.2.
Collingridge, J. Ltd., 36 Wellington Street, Covent Garden, W.C.2.
Cyanamid of Great Britain Ltd., Bush House, Aldwych, W.C.2.
Elliott, Thomas Ltd., Eagle Mills, 120 New Church Road, S.E.5.
Filmer, R. H. Ltd., Union Wharf, Wenlock Road, N.1.
Flower, Major R. A., c/o Lloyds Bank, Cox & King's Branch, Pall Mall, S.W.1.
Fort Darland (Mushroom Farm) Ltd., 35 Piazza Chambers, Covent Garden, W.C.2.
Hartman Fibre Co. Ltd., The, 5 Copthall Court, E.C.2.
Humberstone, J. R., Messrs. T. D. Bridger Ltd., 4 Shelford Place, Church Street, N.16.
Knight, L., Brooklyn, Sewardstone, Chingford, E.4.
Lake, S. E., 61 Curzon Street, W.1.
Lewis & Son Ltd., Edward H., 25 James Street, W.C.2.
Marks & Co. Ltd., 7 & 8 Bow Street, Covent Garden Market, W.C.2.
Mason, Col. W. G., 67 Furscroft, Bryan Street, W.1.
Penny, A. C., 35 King Street, Covent Garden, W.C.2.
Poupart, T. J. Ltd., 110 Long Acre, W.C.2.
Rafferty, Denis, 14 Madeley Road, Ealing, W.5.
Ruzicka, H. J., 41 Queensborough Terrace, W.2.
Shirley Organics Ltd., Vicarage Wharf, Battersea, S.W.11.
Way, S., 26/0 Pickering Street, Islington, N.1.
Woods, Wm., 3 Botolph Alley, E.C.3.

MEXICO

Hongos de Mexico, Madrid, Num. 21-213, Mexico D.F.4.

MIDDLESEX

Albutt, G. H., 550 Uxbridge Road, Pinner.
Berry, A. J., The Dell Mushroom Farm, Reservoir Road, Ruislip Common.
Blake, R. L., c/o G. Hertslet, 9 Bourne End Road, Northwood.

MIDDLESEX—*contd.*

McGladdery, N., Messrs. N. & A. W. McGladdery, Old Mill House, Old Mill Lane, Cowley.
Markes, R. H., "Tregellas," 180 Harefield Road, Uxbridge.
Palfrey, E., 32 Manor Park Gardens, Edgware.
Taylor, R., 59 Waldegrave Park, Twickenham.
Williams, J., Brentford Market, Brentford.

NEW ZEALAND

Collier, 18 Easson Street, Rotorua.
Dempsey, J. L., R.D.2, Hawkes Bay, Napier.
Growse, P. H., 60 South Karori Road, Wellington, W.3.
Hopkins, B., c/o Mr. W. Paton, 3 Crichton Terrace, Takapuna, Auckland.

NORFOLK

Bluestone Farms Ltd., South Creake, Fakenham.
Britton, Major B. G., The Rookery House, Mundesley.
Broadlands Mushroom Farm, White Street, Martham, Great Yarmouth.
Gough, F. & Son Ltd., 63/69 Fishergate, Norwich.
Hopper, I. K., Holmbush, Thornham, Kings Lynn.

NORTHAMPTONSHIRE

Brown, H. A., Avalon, Peterborough Road, Farcet, Peterborough.
Day, J. E., Lowick, Nr. Kettering.
Garrow, J. P., The Barn, 8 High Street, Roade.
Gooding, J. A., 9 Chain Close, Peterborough.
Luxmoore, M. C., Snowcap Mushrooms Ltd., Yaxley, Peterborough.
Noble, B. A., Noble Mushrooms Ltd., Yaxley, Peterborough.
Terrell, F., The Grange, Yaxley, Peterborough.
Wharton, J., c/o Noble Mushrooms Ltd., Yaxley, Peterborough.

NORTHERN IRELAND

Bates, Geo. & Son Ltd., St. George's Market, Belfast.
Bell, George, Hazel Glen, Magheraknock, Ballynahinch, Co. Down.
Forsythe, W. J. & Son Ltd., Fairview Nurseries, Bangor, Co. Down.
Kernohan, S. H., Lower Broughshane, Ballymena.
Lefroy, I., Ferns Hollow, Killaloe, Co. Clare.
McBriar, R. J., Overdale, Saintfield, Belfast.
Moffett, John A., Drumcroon, Coleraine, Co. Derry.
Nelson, R. G., Ballylumin, Ahoghill, Co. Antrim.
Patterson, Robert, Monlough Food Production Co. Ltd., Ballygowan, Belfast.
Robb, Mr., Meadowbrook Hatchery, Armagh Road, Newry.
Taylor, Robert, Rex Products Ltd., Temple Patrick, Belfast.
Young, Mrs. M. B., Mountsandel, Coleraine, Co. Londonderry.

NORTHUMBERLAND

Bird, J. P., Ltd., St. Andrew's Street, Newcastle-on-Tyne.
Leatherland, G. E. Ltd., 20/22 St. Andrew's Street, Newcastle-on-Tyne.
Pearson, S. & Son, 40 Green Market, Newcastle-on-Tyne 1.
Smith, C. B., 38 Princes Road, Brunton Road Gosforth, Newcastle-on-Tyne 3.
Thurston, J. S., 31 Main Street, Spital, Berwick-on-Tweed.

NORWAY

Eyde, S. M., Sande Bruk, Horten.
Reffstrup, Knud, Wollebekk Gard, Okern, Oslo.

NOTTINGHAMSHIRE

Bentley, A. J., Ltd., Frearson Farm, New Eastwood, Nr. Nottingham.
Cave, A. E., The Hollies, East Bridgeford.
Cwynar, S., 392 Valley Road, Basford.

NOTTINGHAMSHIRE—*contd.*

Kavell, W. L., 199 Musters Road, West Bridgford, Nottingham.
Kublicki, S., Old Estate House, Wollaton, Nottingham.
Laniashire, R., 12 Moseley Road, Annesley.
Lichtarowicz, Col. L., Mapperley Mushroom Farm, 7 Mapperley Park Drive, Nottingham.
Nason F. R. Ltd., Avenue "B," Wholesale Market, Nottingham.
Reeve, Geo. H., The Vicarage, South Scarle, Newark.
Smalley, Geo. Ltd., Sneinton Market, Nottingham.
Tooley, C. W. & Sons Ltd., Wholesale Market, Nottingham.

OXFORDSHIRE

Doak, R., Elmwood Farm, Black Bourton, Oxford.
Dudley, Ivor, Elmwood, Black Burton.
Winslade, Miss M. G. D., 95 Stanway Road, Headington.

PORTUGAL

Jurado, Rafael Casau, Rua Da Conceicao, 35, 3, Dto, Lisbon.
Pereira, Manuel, Junr., Conservas de Pene, Redes de Pesca, Rua de S. Paulo, 12-4^o, Lisbon.

PHILIPPINES

Liwayway Trading, P.O. Box 2629, Manila.

SCOTLAND

Alexander, Miss E. K., Red House Mushrooms, Bridge of Allan, Stirlingshire.
Allsop, H. S., Kingsley, Fennwick Road, Kilmaurs, Ayrshire.
Beveridge, John & Co. Ltd., Bridgend, Kinross.
Clelland, Wm. Jnr., Crag Cottage, Burnfoot, Kirkmuir Hill, Lanark.
Conway, J. d'Arcy, Glaschoille, Crotamie, Nr. Drymen, Glasgow.
Dumbreck, R. D., Mossiel, Dysart, Fife.
Galbraith, W. S., Albethy, Bridge of Allan, Stirlingshire.
Harris, R. M., 1 Kintillo Gardens, Bridge of Earn, Perthshire.
Helebrandt, K. S., Kingsley, Crieff, Perthshire.
Henry, James, R., 1 Wemyss Place, Haddington, East Lothian.
Jackson, T., Dillaburn, Lesmahagow, Lanark.
Melville, A. Campbell, Fala, Errol, Perthshire.
Mitchell, W. A. B., The Old Mill, Pitlochry, Perthshire.
Oliver, A. P., The Mushroom Sheds, Buckholme Mill, Galashiels.
Pinkerton, M. H., Hogganfield Farm, Millerston, Glasgow.
Pinkerton's Scottish Mushroom Laboratories, Millerston, Glasgow.
Smith, A., Vermont, Falkirk, Stirlingshire.
Stratton, T., 1 Nethermill Cottages, Aberargie, Abernethy, Perthshire.

SHROPSHIRE

Co-operative Wholesale Society Ltd., Roden, Wellington, Salop.
Thomas, Major H. Seymour, Oerley Hall, Oswestry.

SOMERSET

Ashton Containers Ltd., Winterstoke Road, Bristol 3.
Eclipse Peat Co. Ltd., Ashcott.
Griffiths, G., Wrinton Vale Nurseries, Congresbury.
Lloyd, J. H., Shrub Farm, Brent Knoll, Nr. Highbridge.
Pointing, A. G., Grove House, Weston Park, Bath.
Pointing, S., Byfield Farm, Combe Down, Bath.
Pointing, Ian J., Sulis Manor, Bath.
Pratten, J., High Acres Nurseries, Tunley, Nr. Bath.
Wilson, Major D. A., The Steeple, West Camel, Yeovil.

SOUTH AFRICA

Bartlett, Major R. J., Evenlode Farm, P.O. Marandellas, Southern Rhodesia.
Braeside Mushroom (Pty.) Ltd., P.O. Box No. 77, Hillcrest, Natal.
Burton-Hogan, Major J. J., 9 Russell Road, Port Elizabeth.
Chitters, Dr. Max, 18 St. Andrew's Avenue, Senderwood Post Office, Orange Grove, Johannesburg.
Denny, W. L. M., Everglades Mushroom Farm, P.O. Lyndhurst, Johannesburg.
Dippenaar, Prof. Barend J., University of Pretoria, Pretoria.
East Lynn (PVT) Ltd., P.O. Box 128, Umtali, S. Rhodesia.
Garthorne, D. S., Morning Dew Mushrooms, P.O. Box 202, Johannesburg.
Garlick, Mrs. Joyce, Chilterns, Wynberg, Cape.
Hillcrest Mushroom Products, P.O. Box 75, Hillcrest, Natal.
Hulley, P., Orkney Farm, P.O. Box 455, Umtali, Southern Rhodesia.
Kark, Dr. Charles, 58 Lister Buildings, Jeppe Street, Johannesburg.
Kumst, Cyril, Lot 35 Epsom Road, Newmarket Estates, Alberton.
Louw, Dr. P. G. J., P.O. Box 87, Lyttelton.
Middleton, C. B., 117 Nelson Road, West Turfontein, Johannesburg.
Omerod, C. O., P.O. Box No. 282, Stettenbosch.
Robertson, Mrs. H. F. G., P.O. Box 93, Bergvlei, Transvaal.
Skeels, W. R., "Midhurst," Constantia, Cape.

SOUTH AMERICA

Beck, Alfred, Apartado Aereo 6465, Bogota, Colombia.
Canto, Alfonso Perez, Casilla 15, San Jose De Maipo, Chile.
Rhodes, J. De, Compagnia Colombiana De Seguros, Dptol Legal, Bogota, Colombia.
Schreiber, Enrique D. A., Viel 885-2, Buenos Aires, Argentina.

SPAIN

Roca, Jacques, Mandri 60, Barcelona.

STAFFORDSHIRE

Brown, P. C., The Birches, The Coppice, Biddulph, Stoke-on-Trent.
Brammer, J. D., Wood Farm, Bagnall, Stoke-on-Trent.
Dajnowicz, S., Bonehill Mushroom Farm, 25 Park Lane, Bonehill, Tamworth.
Dickinson, Thomas, Wholesale Market, Wolverhampton.
Dingley, Alan, 84 Station Road, Polesworth, Tamworth.
Homer, C. H., 139 Waterfall Lane, Blackheath.
Howse, R. R., Nine Acre Farm, Codsall.
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